



## SCIENCE FOR COMMUNITIES

*Dedicated and highly skilled geologists, geophysicists, and other scientists are working to protect and preserve our natural resources and environment, keeping us safe from natural disasters and promote our appreciation for the beauty and grandeur of nature.*

*President George W. Bush*

Science is a foundation for the Department of the Interior's land management decisions, supporting work to achieve resource protection, resource use, recreation, and serving community goals. The 2006 budget continues science programs that generate relevant, objective information for land managers and for communities throughout the Nation by proposing \$933.5 million for the U.S. Geological Survey.

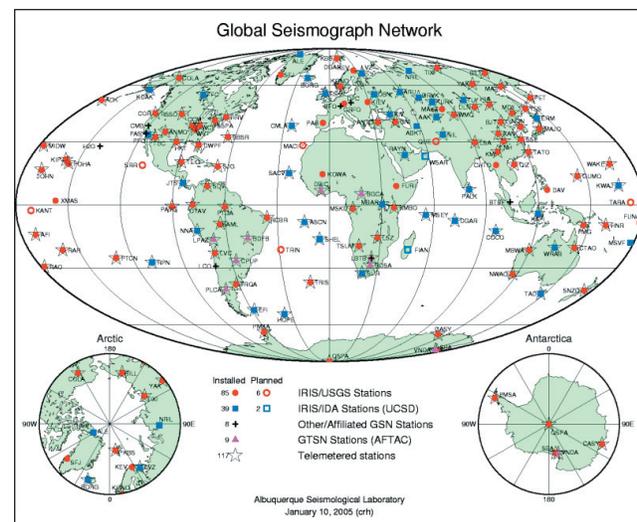
The USGS is Interior's primary source of scientific research, earth sciences data, and other geologic and mapping information. The majority of USGS funding contributes to meeting Interior's serving communities goal. The USGS outcomes and measures for this goal focus on providing science to customers that address the Nation's complex land and resource management problems. The ultimate outcome is information to support decisions, set priorities, reduce risk from natural hazards, and monitor land conditions. Decisionmakers and scientists in other bureaus rely on USGS for objective scientific results and well-designed application programs to translate the information to specific land use or resource decisions.

Major areas of emphasis for USGS science in 2006 include funding to improve the USGS earthquake monitoring capability to support an expanded tsunami warning system; strengthen volcano monitoring; ensure the continuation of Landsat imagery in the near term and for the future; and enhance the interdisciplinary research in Puget Sound on watershed and marine ecosystems.

**Tsunami Warning System** — Drawing on lessons from the December 26, 2004 tsunami that caused such massive devastation in Indonesia, Thailand,

India, and Sri Lanka, the Administration proposes to commit \$37.5 million in 2005 and 2006 to expand U.S. tsunami detection and monitoring capabilities. Investments by USGS and the National Oceanic and Atmospheric Administration will strengthen the existing tsunami warning system in the Pacific and add new systems in the Atlantic, Caribbean, and Gulf of Mexico. These measures will provide nearly 100 percent detection capability for a tsunami with the potential to affect the United States.

The USGS will contribute to this initiative by improving and expanding the Global Seismographic Network to provide more robust detection and notification of earthquakes that could trigger tsunamis. The USGS will also enhance the capability of the National Earthquake Information Center to provide faster notification of earthquakes in and near the United States and its territories. These improvements and enhancements will be funded



by a 2005 supplemental funding request of \$8.1 million and a 2006 request of \$5.4 million.

The work that USGS will undertake as part of the tsunami initiative will additionally have the benefit of improving its seismic monitoring and information delivery as a whole, which will benefit the reporting of earthquakes nationwide. This will result in a more rapid, real-time earthquake detection and notification system, improved algorithms for shake maps, finite fault modeling, rapid aftershock identification, and a decrease in the reporting time of global earthquakes from just over an hour to about 20 minutes.

**Increased Volcano Monitoring**—Each year, on average, five to ten U.S. volcanoes exhibit unrest that consists of some combination of ground deformation, earthquakes, increased emission of volcanic ash, or increased hydrothermal activity. Periods of unrest may or may not develop into eruptions; but on average, one eruption occurs in Alaska every two years, one in the Cascades every decade, and the Kilauea Volcano in Hawaii has been erupting continuously for the last 20 years. Today, Mount Saint Helens exhibits continued activity and there are increasing signs of unrest at Mauna Loa, Yellowstone, and Three Sisters in Oregon. Globally, there are about 1,500 active volcanoes.

The USGS currently monitors 51 volcanoes in the United States and its territories. The USGS has a long-term goal of monitoring all the potentially active volcanoes in the United States to improve the forecasting and warning of volcanic events. An immediate goal of the USGS is to provide the volcanic information necessary to assist communities in managing potential risks. The 2006 budget proposes an increase of \$864,000 to enhance



monitoring at the most active volcanoes within the United States, presenting the greatest risk to property and safety.

**Land Remote Sensing**—For more than 30 years, Landsat satellites have collected data of the Earth's continental surfaces to support global change research and applications. This data constitutes the longest continuous record of the Earth's surface as seen from space. By imaging Earth's land environment at a resolution sufficient to record the impacts of human activities, Landsat complements U.S. global imagers.



Landsat data is important for a variety of scientific, land management, and commercial activities including wildland fire management, detecting and monitoring invasive plant species in remote regions, assessing water volume in snow pack and large western aquifers, assessing the stewardship of Federal grazing lands, monitoring the land use/land change in remote regions, global crop monitoring, and global mapping.

The first satellite in the Landsat family, Landsat 1, was launched in 1972. Landsat 7, the most recent, was launched in April 1999. Although Landsat 7 continues to operate, the data that it displays is flawed due to the failure of its scan line corrector. This results in images with area gaps that affect about 25 percent of the image data.

The scan line corrector anomaly increases the importance of the Landsat Data Continuity Mission, which represents the next phase of the Landsat program. The LDCM will acquire and deliver highly calibrated, medium-spatial-resolution remotely sensed data, continuing the legacy of

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continuous collection of Landsat-like data. The LDCM will consist of an operational land imager sensor flown on two of NOAA's six satellites within the National Polar-Orbiting Environmental Satellite System. The LDCM mission is a partnership between NASA, NOAA, and USGS.

The role of USGS in the LDCM project will be to design, develop, and deploy an upgraded, ground-processing system to acquire, process, archive, and distribute Landsat data at low cost. The 2006 budget requests \$7.5 million to develop, test, and implement components of the ground system needed to download, archive, and distribute the LDCM data. The launch of one of the NPOESS satellites is expected to occur in 2009, with data products ready for distribution to the public by April of 2010.

In the interim, USGS has developed Landsat imagery products that fill in Landsat 7's scan line corrector gap with older data taken from the most recent images of the gap area. However, since the anomaly with the scan line corrector occurred, USGS has not been able to collect enough revenue through the sales of Landsat data to pay for the full costs associated with the collection and distribution of the data.

During 2004, Interior reprogrammed \$4.8 million from other activities to cover those costs. In 2005, USGS will propose reprogramming \$6.0 million to cover the shortfall. This funding level will be achieved by deferring costs on some projects until 2006. The 2006 request includes \$12.0 million for Landsat, which includes \$6.0 million to replenish the funds deferred from 2005 and \$6.0 million to cover the 2006 shortfall stemming from the failure of the scan line corrector. The arrangement will maintain the operation of Landsat 7 and the continuity of Landsat data collection.

**Puget Sound** — The health of the Puget Sound ecosystem has deteriorated as a result of pressures from a growing urban population that is expanding in rural landscapes. Nine of the ten fish and wildlife species in the region listed as endangered or threatened under the Endangered Species Act inhabit the near-shore zone of the Sound. Diking of wetlands, armoring of eroding bluffs, and discharge of pollutants, nutrients, and ballast water have resulted in loss or degradation of coastal habitats, contamination of coastal waters and sediments, declining fish and wildlife populations, and invasion of exotic species.

Today's population of nearly four million people in the Puget Sound area is projected to double in the next 50 years, and the region will require inter-disciplinary science to enable resource management that mitigates the impact of this growth on Puget Sound. To address this need, the 2006 budget proposes \$912,000 for USGS to improve its ability to provide critical scientific information to local, State, tribal, and Federal decisionmakers considering the protection and restoration of the coastal ecosystems of Puget Sound.

